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VOL. IV. No. 3. JANUARY 1911.

STORAGE

TRANSACTIONS

OF THE

SOCIETY OF TROPICAL MEDICINE AND HYGIENE.

London:
SOCIETY OF TROPICAL MEDICINE AND HYGIENE,
11, CHANDOS STREET, CAVENDISH SQUARE, W.

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11, CHANDOS STREET,
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JANUARY, 1911.

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Proceedings of a Meeting of the Society on Friday, December 16th, 1910.

FLEET-SURGEON COLLINGWOOD, M.V.O., in the Chair

(in the absence of the President and Vice-President).

Dr. SEIDELIN, of Yucatán, showed preparations of the blood and sections of the kidney from a case of yellow fever, containing an organism, which he believed to be associated with yellow fever.

Dr. SEIDELIN also contributed the following statement: I greatly regret that I was not present to hear the valuable paper which Sir RUBERT BOYCE read at the last meeting of this Society, more especially so, because the author has recorded just the same experiences of mistaken diagnosis which I have met with so frequently in Yucatán, so that I can heartily support the opinions set forth in the paper of which I have seen the report in the *Journal of Tropical Medicine.*

It has also been my experience that there is a tendency amongst physicians, especially when holding official posts, not to notify a case of yellow fever, and so it happens that very often when in doubt a diagnosis is made of inflammatory fever or bilious fever or *embarras gastrique*, as mentioned by Sir RUBERT BOYCE, or as I have often seen of gastric fever or sometimes influenza. There is no doubt that the last-named disease may be very much like the abortive forms of yellow fever, especially because of the prominence of headache and pain in the back and extremities as symptoms in both diseases; but as influenza

as a typical disease seems to be extremely rare in Yucatán (most of the influenza-like diseases were, as far as I observed, produced by the *micrococcus catarrhalis*), it would not seem likely that the atypical forms should be frequent. I believe that I have observed many atypical and slight attacks of yellow fever in foreigners, and it would be well to recall the opinion expressed by MARCHOUX and SIMOND that the immunity is often produced and conserved by repeated slight attacks. As to the natives it seems most probable, as is believed by the same author and many others, that the immunity which they are generally supposed to enjoy is as a rule acquired in infancy or childhood, but it is certainly very difficult to say anything definite about the forms under which this variety of the disease presents itself.

The importance of a correct diagnosis cannot easily be overestimated. Not alone are to be considered all the inconveniences regarding isolation and quarantine, but also the feeling of security which the patient will possess when he is declared to have had yellow fever and consequently considers himself immune, and which might induce him not to take such precautions as might otherwise be reasonably expected. The most important elements in the diagnosis are certainly the course of the temperature; the albuminuria, which probably is not so constantly present in any other disease at so early a date, and as especially mentioned by Sir RUBERT BOYCE, the lack of correspondence between temperature and pulse; the pulse is nearly always considerably slower than would be expected in view of the elevation of the temperature and during convalescence this slower pulse rate is more pronounced; I have seen the pulse go down to 32. I do not mention the black vomit and the jaundice because I am speaking only about the doubtful cases, but I should like to refer to two symptoms which are not generally mentioned in the description of this disease. First, to the diazo-reaction in the urine, about which so far as I know only one report has been published, that by FERRARI, who, as quoted by OTTO, has found negative results. Personally I have also been informed by one of the foremost authorities on yellow fever, Dr. GUITERAS, in Habana, that he does not find this reaction. In my experience, however, this is not correct, as I have published with Dr. VARGAS,* last year, the statement that we found

* *Berliner kl. Wochenschrift*, 1909. No. 19.

the reaction present quite frequently, in fact, in nine cases out of a series of twenty-two; and this proportion must be considered as a minimum, as the reaction was often only investigated once in each case, whilst in the cases where it was repeated daily we found considerable variations as to its presence. I do not claim for this symptom much importance as an aid to diagnosis, but I must contend that its presence can by no means be regarded as contra-indicating a diagnosis of yellow fever.

The other symptom, which I wish to refer to, is that of petechiæ. Sir RUBERT BOYCE mentioned that, I am glad to see, but it is very seldom mentioned. I have seen it at least twice, once in myself, on my legs, after a benign attack of yellow fever, and once on the legs of a man who died of the same disease. One would expect to find petechiæ, as they are so frequent in the internal organs—and they certainly exist, but seem to be rare in the tegumentary tissues.

As in other diseases, the one thing to be desired is, of course, to be able to demonstrate the presence of the specific microbe, which all agree does exist, but which nobody has so far been able to demonstrate, in spite of all the efforts which have been made to identify it. Such demonstration would at once settle the question of the diagnosis. In view of these difficulties it is with some hesitation that I have ventured to publish my own investigations, but I have felt it right to do so, as I have found certain bodies in the blood of yellow fever patients so constantly that there seems good ground for regarding them as specific organisms.

A preliminary report of these researches was published last year in the *Berl. kl. Wochens.*, and a more detailed one will soon appear in the *Journal of Pathology;* therefore I will not enter into any lengthy particulars, but I am happy to seize the opportunity which has been kindly offered me to present some preparations for this Society.

The preparations represent various of the intra-corpuscular and free forms as they are seen in the blood-smears taken during life and in the capillaries of the kidney. It will be seen that some of the intra-corpuscular forms present a certain likeness to malarial parasites, whilst the ring-shaped collections of chromatin-points, which are seen in one of the kidney preparations, would give the impression of asexual forms undergoing division, and the larger one in the blood that of a sexual form. However, it would be premature at present to discuss the nature and biology of the supposed parasite; it may be stated

only that there have been found in nearly ninety per cent. of the cases examined extremely small intra-corpuscular bodies, which show a more or less pronounced chromatin and protoplasma staining by Giemsa's and Leishman's methods, and somewhat larger free organisms which are supposed to be of the same nature.

Their aspect certainly suggests a protozoal nature, and because of their complete lack of pigment, and the very frequent existence of two or more chromatin-spots, one would perhaps feel more inclined to associate them with the piroplasma than with the malarial hæmamœba.

The data brought forward would now, I believe, justify a new thorough investigation of the whole matter, by means of a special commission or otherwise. Earlier commissions have studied yellow fever principally from an epidemiological point of view, and have only incidentally occupied themselves with the microscopical question; and my own work has also been, to a certain extent, incidental, and rendered very difficult by other laboratory work and teaching. Constantly I have regretted that I could not dedicate myself wholly to work in a field where so much still remains to be done. On the whole, the existence of a protozoon as the etiological factor corresponds very well with the epidemiologically known data, but, in one particular, findings seem to contradict the usually accepted theories, and this objection has been raised against my results in the course of a private discussion. It is said that the blood of yellow fever patients is not infective after the third day, and that therefore the microbe ought not to be present in the blood after that time, yet I have found those organisms present at a much later date. Now, it is possible that both may be true, and that the later forms may not be able to develop after transmission. But let us examine the arguments on which the accepted theory rests. So far as I can see, there are only four experiments by MARCHOUX and SIMOND of injection of blood taken from yellow fever patients into other individuals after the fourth day, though in each case with negative results. In only one of the four cases was it proved by a later experiment that the individual was susceptible of infection, and one negative result does not prove anything at all, especially as the authors record other negative results, which they explain as due to the presence in the blood injected of antibodies. Again, three of the experiments were made with filtered serum, and amongst these the one just referred to of the individual who was demon-

strated to be susceptible, and it might easily happen that filterable forms are only present during the first few days, because the later forms are either too large or intra-corpuscular; in fact, it would not seem unreasonable to suggest that the filterable elements are of the nature of free merozoites, extremely small, and perhaps invisible. The principal object for the near future would evidently be to investigate anew the possible presence of similar organisms in infected mosquitoes, as those here described.

The discussion on Sir RUBERT BOYCE's paper on "The Distribution and Prevalence of Yellow Fever in West Africa," which had been read at the last Meeting, was then resumed.

Dr. J. P. TULLOCK: I have to offer a few words of explanation of my presence here to-night and of my occupation of the—to me—important and difficult position of opening this discussion. I had not the opportunity of hearing Sir RUBERT BOYCE's paper, although I have since seen it, nor had any inkling of the new view therein laid before this Society reached the West Indies before I left Trinidad. There are, of course, many men in London and in the West Indies more competent to deal with this paper than I am, but it so happens that there is no one available with as much experience of yellow fever and bilious remittent fever as I have. Further, and what has weighed very considerably with me is the feeling that some one should appear on behalf of the West Indian Services to express what I feel sure must be the opinion of the majority of them, viz., that the new and somewhat alarming conclusion at which Sir R. BOYCE has arrived should not be accepted without very careful and thorough consideration. I know nothing of West Africa; but I take it for granted that Sir RUBERT must follow the view he has expressed in his paper to its logical conclusion, and that he holds that yellow fever is as much endemic in the West Indies as it is in West Africa. Our so-called bilious remittent fever appears to be practically the same as it is in Africa, and if the one is mild yellow fever, so I take it must the other be. Of both of these diseases I can claim to know something. I have never to my knowledge had yellow fever, but I *have* had twice what I and others considered to be pretty severe bilious remittent fever. I saw very little of the 1893-1894 epidemic of yellow

fever, as I was then stationed in Tobago, but I was through the 1907-1908 outbreak and saw a good many cases. Let me first describe what we in Trinidad and Tobago call bilious remittent fever. We consider it to be a form of malaria, in which the principal manifestations are gastric and hepatic. Its onset is almost always preceded by some marked reduction of one's resisting power, the result of temporary want of food, undue exposure or over-exertion, or chill, or a combination of these occurring in an individual who has been exposed to malarial infection. You get initial chill or slight ague, rising temperature, a coincident pulse ratio, head-ache, back-ache, general bone-ache, flushing of the face, injected conjunctivæ and furred tongue, with constipation. Later you have some yellowing generally confined to the sclerotics. The urine is very high coloured and bilious. There is slight enlargement and tenderness of the spleen, and there is epigastric distress and tenderness. But the one symptom which overshadows all others is the awful, the unforgettable vomiting, first of the stomach contents, then of bilious fluid of the most intensely bitter description, and finally nothing at all. The straining, expulsive efforts are so violent that they frequently cause slight streaks of red blood to appear in the vomited matter. This is purely mechanical. There is no hæmorrhagic tendency in the bilious remittent fever with which I am familiar. In fatal cases I have repeatedly felt that an important factor in determining the issue was the exhaustion caused by this terrible vomiting. The one drug that has any effect in the treatment of our bilious remittent is quinine. After relieving the congested liver by calomel you have to get quinine into the system—not, of course, into the stomach, which is only goaded to increased expulsive effort by its administration *per oram*, but by intra-muscular, or in children by rectal injection. Now compare this disorder with yellow fever. One attack of yellow fever confers immunity for life. I have had bilious remittent twice, at least. A lady patient of mine, who had recovered from yellow fever in Barbados, in 1881, very nearly died from our bilious remittent in 1888. Yellow fever is epidemic, bilious remittent is endemic. Yellow fever is characterised by a tendency to hæmorrhage, and the urine in pronounced cases is always albuminous. In bilious remittent I have never seen hæmorrhage, and albuminous urine is with us a rarity, and probably a coincidence. The vomiting of bilious remittent is its most distressing symptom. In yellow fever the vomiting is never anything

like so severe, and the pathognomonic black vomit is a mere syphoning out of the stomach contents. In yellow fever quinine has no appreciable effect, in bilious remittent it is a specific. During our last epidemic we did see many cases of mild yellow fever among the negro population, and we actually recognised a fair proportion of them. They had all the appearance of ordinary seasonal malarial fever, except that a little extra care in examination showed slight jaundice and albuminous urine, the latter often quite well marked. Their existence explained the erratic distribution of admitted cases of yellow fever, but they bore a very slight resemblance to the severe form of bilious remittent, with which I am familiar. Sir RUBERT admits that in Barbados, which is fortunate enough to have no malaria, yellow fever is introduced from without. Does he hold that Trinidad, with as large and as varied a maritime trade and with its immediate proximity to the Spanish Main, produces or is able to produce its own epidemic? If so, how does he explain the non-occurrence of yellow fever in Tobago, with, I believe, a greater prevalence proportionately of bilious remittent, but with an insignificant shipping trade? We, in Trinidad, can endorse Sir RUBERT'S strictures on the, to some extent, justifiable desire of the authorities to prevent notification of yellow fever cases. His remarks about the Press do not apply to us. To do them justice they do not as a rule attempt to influence us, nor would we be much influenced if they tried. But it is different when pressure is exerted by one's official superiors, and the result is that the name of Trinidad undoubtedly and deservedly stinks in the nostrils of its neighbours, on account of its suppression of damaging information. Had Sir RUBERT merely stated that well-marked cases of yellow fever had been returned as bilious remittent, we would be with him to a man. We have, nearly all of us, done it, but circumstances have recently occurred which will render its repetition improbable. Even when we were certifying death as being due to "malignant or pernicious remittent fever of a hæmorrhagic type," we knew the difference between the two diseases, and we are quite alive to the fact that an epidemic disease, characterised by jaundice, erratic pulse ratio, albuminous and scanty urine, hæmorrhage, and a high mortality, was not the same as an endemic malarial fever, whose symptoms are distressing, vomiting, slight yellowing of the sclerotics, splenic tenderness, deeply bile-stained non-albuminous urine, a tendency to recovery, and curability

by quinine. I have not approached this matter from the scientific side. I have not the data with me. I leave that to the scientists present here to-night. Nor, as a matter of fact, has Sir RUBERT himself. How can he? This brings me to my last word. It is hard, gentlemen, to disprove a theory which is itself incapable of proof. In the absence of any knowledge of the organism which causes yellow fever, it is impossible for Sir RUBERT BOYCE to demonstrate the accuracy of his new view. He has sprung upon the world of Tropical medicine and on the public a theory ingenious, interesting and, for all we *know* to the contrary in some cases, correct, but he cannot prove it. Has he considered what the acceptance of his view would mean to the West Indies; what new terror it would lend to life in the eyes of the ignorant; what interferance with trade it would cause, and especially with the important tourist trade; what new vexations of quarantine, already vexatious enough, he would encourage? I venture to appeal to him not to lend the prestige of his name and position to the further pressing on the profession and on the public of his views till the day when our knowledge of yellow fever becomes as definite and exact as it is of malaria. No harm would be done. No measure of sanitation need be neglected. The extirpation of stegomyia can be effected as readily under the old theory as under the new, and much worry, anxiety and expense will be avoided. To you, gentlemen, I appeal not to accept a clever theory which may be right, but which may be wrong, the rejection of which would do no harm—the acceptance of which will most certainly lead to inconvenience and financial loss.

Professor W. J. SIMPSON: Sir RUBERT BOYCE has done good service to West Africa in drawing attention to the presence of yellow fever on the coast and to its not infrequent prevalence. Few have realised that it is a disease which counts in the causation of the periodic unhealthiness of West Africa.

There is ample evidence of the prevalence of yellow fever on the mainland of the West Coast of Africa during the past 150 years, just as there is evidence that it did not exist there before that period. The most instructive history I know of in this connection is the recent work of AUGUSTIN'S, published in Orleans in 1909. There it is shown that

yellow fever attacked the followers of Columbus at Ysibella, San Domingo, in 1493, fourteen months after the discovery of America. This was ten years before the first shipment of slaves was brought to San Domingo by the Portuguese. Dr. FINLAY also shows that the Maya records takes back outbreaks of yellow fever in Yucatan to a period before America was visited by Columbus.

The Canary Islands became infected in 1494, 1495, and 1496, by the Spaniards returning in their vessels and touching at these islands. The Cape Verde Islands became infected later in 1510, Benin in 1520, and St. Thomas Island in 1558. But even with these importations the disease does not appear to have taken root on the mainland until 1759, where it first affected a lodgment in St. Louis at the mouth of the Senegal river, which was then in possession of the English, and from there it spread three years later to the Gambia and next year to Sierra Leone.

Later the disease was maintained in these areas and carried backwards and forwards by war operations between the English and French, and was the cause of some terrible mortalities. Yellow fever became endemic in these areas, attacking the crews of the squadron of the West Coast of Africa which frequented these ports, and the crews of the merchantmen vessels, which carried on an extensive commerce with the West Indies and Brazil. In those days, when there were large numbers of Europeans living in Sierra Leone, there were periodically severe outbreaks of yellow fever.

There is an interesting table of the visitations of yellow fever in West Africa, showing the yellow fever years and periods of immunity for 414 years from 1494 to 1907.

In the table it will be noted that from 1494 to 1759, there are long periods of immunity. During this time, with the exception of Benin and St. Thomas, the yellow fever was confined to the Canary Islands, Madeira and Cape Verde Islands. The next period represents its presence on the mainland and on the islands, including Bulam, Fernando Po and Ascension. Here the periods of immunity are short and correspond much with the table given by Sir RUBERT BOYCE.

TABLE I.

Summary of Yellow Fever Years and Periods of Immunity in Africa for Four Hundred and Fourteen Years, 1494-1907.

Yellow Fever Years.		Periods of Immunity.	
1494-1496	3	1497-1509	13
1510-1515	6	1516-1519	4
1520	1	1521-1530	10
1531	1	1532-1552	21
1553	1	1554-1557	4
1558	1	1559-1581	23
1582	1	1583-1587	5
1588	1	1589-1598	10
1599	1	1600	1
1601	1	1602-1605	4
1606	1	1607-1638	32
1639	1	1640-1700	61
1701	1	1702-1752	51
1753	1	1754-1758	5
*1759	1	*1760-1761	2
1762-1764	3	1765	1
1766	1	1767	1
1768-1769	2	1770	1
1771-1773	3	1774-1777	4
1778-1779	2	1780-1785	6
1786	1	1787-1791	5
1792	1	1793-1803	11
1804	1	1805-1806	2
1807	1	1808	1
1809-1812	4	1813-1814	2
1815-1816	2	1817	1
1818-1819	2	1820	1
1821-1830	10	1831-1836	6
1837-1839	3	1840-1844	5
1845-1848	4	1849-1851	3
1852-1860	9	1861	1
1862-1869	8	1870-1871	2
1872 1873	2	1874-1877	4
1878 1882	5	1883	1
1884	1	1885-1887	3
1888	1	1889-1890	2
1891-1892	2	1893-1896	4
1897-1907	11		
Total Yellow Fever Years	101	Total Years of Immunity	313

This table, and that of Sir RUBERT BOYCE, show that yellow fever is endemic on the West Coast of Africa in the sense that it no longer requires importation from the original cradle of yellow fever to set up an epidemic. It does not exclude importation from America when there is communication, but it recognises that in West Africa, which consists of a few islands and over 2,000 miles of coast, there may be places like Havana in Cuba, or Vera Cruz in Mexico, from which infection may be carried to other places, and from these latter to others which may be healthy. This is one view of endemicity, and it exonerates the greater part of the 2,000 miles from yellow fever, except on those occasions when the infection is carried there. The other view of endemicity is that held by Sir RUBERT, viz., that the native children suffer from mild attacks of yellow fever, and that for Europeans the acclimatization fever of West Africa is a mild form of yellow fever, which in the more pronounced cases are bilious remittents, and in the malignant forms show the classical symptoms of yellow fever, accompanied with black vomit. Possibly this latter view may be right, but there are at present no important facts to support it as far as West Africa is concerned, and at the most it can only be a working hypothesis for a Commission of Enquiry. I admit that there is a difficulty in coming to a conclusion, owing to there being no death certification of natives. *Stegomyia calopus* exists in West African towns in large numbers, but that existence indicates the risk which is likely to arise should the infection of yellow fever be imported rather than a proof that yellow fever exists in a mild form. Their presence, and the *rôle* they play in yellow fever, is a reason for their destruction. Similarly the figures given by Sir RUBERT BOYCE and those I have given, although they show a remarkable persistence of the disease on the West Coast of Africa, need analysis before a conclusion can be arrived at. It is necessary to know if these yearly prevalences are located in particular centres, or are general throughout the coast towns wherever stegomyia are found, and if they are located in centres what are the circumstances connected with these centres?

Table II., taken from AUGUSTIN'S work shows the localities in West Africa which have been visited by yellow fever.

It will be seen that while some have had frequent visitations, such as Sierra Leone, Senegal, Canary Islands, Cape Verde Islands and

TABLE II.

YELLOW FEVER VISITATIONS IN AFRICA BY LOCALITIES.

Locality.	Year of first appearance.	Year of last appearance.	Total Number of Visitations.
Angola	1860 ...	1865 ...	4
Ascension Island ...	1818 ...	1873 ...	6
Banana Islands ...	1847 ...	1847 ...	1
Benin	1520 ...	1873 ...	12
Bonny	1862 ...	1891 ...	2
Bulam	1792 ...	1792 ...	1
Calabar	1862 ...	1862 ...	1
Canary Islands ...	1494 ...	1905 ...	21
Cape Verde Islands ...	1510 ...	1900 ...	20
Congo Coast	1816 ...	1900 ...	4
Dahomey	1906 ...	1907 ...	2
Fernando Po.... ...	1732 ...	1869 ...	11
French Guinea ..	1901 ...	1901 ...	1
Gambia	1762 ...	1900 ...	16
Gold Coast	1778 ...	1898 ...	13
Ivory Coast	1852 ...	1903 ...	9
Lagos	1864 ...	1864 ...	1
Madeira Islands ...	1738 ...	1738 ...	1
Morocco	1804 ...	1881 ...	2
St. Helena	1830 ...	1830 ...	1
St. Thomas	1558 ...	1583 ...	1
Senegal	1759 ...	1905 ...	21
Sierra Leone	1763 ...	1884 ...	34
Soudan	1828 ...	1907 ...	15
Total Number of Yellow Fever Eruption in Africa from 1494 to 1907			200

Gambia, others, such as Calabar, Lagos, Madeira, St Thomas and Dahomey, have only been affected once or twice. It is fairly obvious that those localities that have been affected but seldom can hardly be considered to have the disease in an endemic form. If we were to go on the figures alone it might readily be inferred that the Canary Islands were endemic centres of yellow fever. In reading the history of the more important outbreaks on the coast, the impression borne in on one is the frequency with which the disease was traced to importation from a previously infected centre.

Taking Sir RUBERT'S table, and including in it the years in which doubtful cases occurred, or cases which he suspects may have been yellow fever of a mild or severe type, I have placed them according to locality.

Table III. brings out the following facts :—

TABLE III.

Tabular Statement showing the Years in which the Colonies in West Africa had Yellow Fever Cases.

Senegal.	Gambia.	French Guinea.	Sierra Leone.	Ivory Coast.	Gold Coast.	Togo-land.	Da-homey.	Lagos.	Southern Nigeria.			
									Sapoli.	Widah.	Warri.	Bonny.
1768	1768	Nil.	1793	*1899	1819	*1896	†1905	*1894–6	*1898–9	1907	1860–70	1873
1769	1769		1800	‡1900	1823	†1905	†1906	‡1902–5				1883
1778–9	1837		1815	‡1903	1824	†1906						*1890–1
1814	1842		1822	†1904	*1894							1909
1816	1845		1823	†1905	*1895							
1828	1852		1824	†1906	*1896							
1830	1870		1825		*1897							
1837	1878		1826		*1898							
1840	‡1900		1827		*1899							
1841			1829		‡1901							
1845			1835		‡1902							
1846			1836		‡1903							
1852			1837		†1904							
1858			1838		†1905							
1863			1839		†1906							
1866–7			1844		1910							
1872			1845									
1878			1847									
*1897			1848									
‡1900–1			1850									
‡1902			1854									
‡1903			1865									
1904			1866									
1905			1872									
1906			1884									
			1885									
			*1891									
			*1893									
			*1894									
			1910									

Analysis of the Years in which Yellow Fever occurred in the Important Coast Towns on the Gold Coast.

Axim.	Sekondi.	Elmina.	C'pe Coast	Saltpond.	Winnebah	Accra.	Addah.	Quittah.
†1905	1910	*1894	1819	*1895	†1904	*1895	Nil.	*1894
1910		*1895	1821	*1897		*1896		‡1900
		‡1902	1823	*1898		*1899		
			1824	*1899		†1905		
			1829	‡1901		†1906		
			*1895					
			*1897					
			‡1901					
			‡1902					
			‡1903					

The table also shows how long each locality has been free of yellow fever.

* The first great wave which infected successively the several coast towns in Sierra Leone, Gold Coast, Togo-land, Lagos, Senegal, and Ivory Coast.

† Another wave, which, beginning in 1904, continued till 1906, affecting the Ivory Coast, Axim, Winnebah, and Accra in the Gold Coast, Togoland, and Dahomey.

‡ An intermediate prevalence, affecting a few towns such as Elmina, Cape Coast, Saltpond, Quittah, and Lagos.

(1) That Senegal and Sierra Leone have been affected many times with yellow fever.

(2) That in later years the Gold Coast and Ivory Coast have been more frequently affected than formerly.

(3) That the other colonies, such as Togoland, Dahomey, Lagos and Southern Nigeria, have been very seldom affected.

If further, the Gold Coast be separated into its important coast towns, and the years of yellow fever be distributed according to the town in which the yellow fever occurred, we find that Addah has never been affected; Winnebah has only been affected once, and that was a single case; Sekondi only once, which was this year; Axim twice, with five years intervening; Elmina three times, with seven years intervening between 1895 and 1902, since which, for a period of eight years, there have been no cases. The only towns that have been frequently affected are Cape Coast, Saltpond and Accra, and even with these there have been no cases in Cape Coast for seven years, in Saltpond for nine years, and in Accra for four years.

Sir RUBERT points out that it was only in 1910 that effective sulphur fumigation of the infected stegomyia was attempted on the West Coast to combat the outbreaks in Sierra Leone, Sekondi and Axim. This fact is in favour of the disease having been successfully dealt with, and being prevented from importation into other towns. In 1893 and 1894, when there was an outbreak of yellow fever in Sierra Leone, the disease spread to Elmina on the Gold Coast, from there to Cape Coast, and from Cape Coast to Saltpond and Accra. Also to Quittah, Togoland and Lagos, and possibly to the Ivory Coast.

The other marks besides the asterisks on the table refer to other waves affecting the different Colonies, and which were most likely derived from the Ivory Coast, where yellow fever has for several years been very prevalent and fatal. It will be observed that the 1910 outbreak in Sierra Leone was preceded by sixteen years of immunity from the disease; or if as is believed by some that a death occurred in a European in Sierra Leone, in November, 1909, then by fifteen years' immunity. The time is sufficiently long to preclude any other explanation than importation. The same remark applies to the Gambia. Between the outbreaks of 1878 and 1900, twenty-two years intervened, and since 1900 a period of ten years has elapsed and there has been no reappearance.

As regards the independent origin of yellow fever in 1910 in Sierra Leone, Sekondi, Saw Mills and Axim, the dates on which they occurred admit of the infection having been carried to them from an infected place. The Saw Mills, in which one case occurred, is only twelve miles up the railway line from Sekondi, and Axim is a four hours' voyage from Sekondi, or less than two days' march by land.

Much importance is attached by Sir RUBERT BOYCE to the production of mild cases of yellow fever by the experiments of Dr. FINLAY and the American Commission, but eighteen per cent. of very mild cases of yellow fever still leaves eighty-two per cent. of distinctly typical cases. It is important also to remember that CARROLL'S remarks that the experiments of the Commission demonstrated that yellow fever may be so mild in character that no man, no matter how extensive his experience may have been, would dare to diagnose it as such unless he heard the disease to be prevailing at the time applied to only a small percentage. It will be remembered that CARROLL, who allowed himself to be bitten by a single mosquito, nearly lost his life by the severity of the attack of yellow fever that this single mosquito produced, and that Dr. LAZEAR of the Commission died of an attack of yellow fever. I should like to quote here what Professor PATTON, of New Orleans, and formerly Secretary of the Louisiana State Board of Health, says on this subject. He says: "Later, when sufficient proof of the conveyance of infection by the bites of mosquitoes had accumulated to satisfy the most sceptical, experiments on human beings were discontinued as being attended by risk of life even when most carefully conducted."

These results are the same as are obtained by experiments with other inoculable diseases. For instance, by careful inoculation of small-pox lymph, a mild disease can generally be produced in the majority of cases, which is protective against the natural infection, but experience shows that the disease thus produced is not always mild, and may be fatal. One would not assume from the result of these experiments that small-pox contracted in the natural way would generally be mild and atypical. Physicians with much practical experience of small-pox know there are very mild cases in every epidemic, the proportion varying in different outbreaks, but that the majority are typical and severe, which is the very opposite condition from the experimental cases. Probably the nearest approach to a natural experiment is an outbreak of yellow fever on a

man-of-war. I will illustrate this by giving the figures of an outbreak on the warship "Archer," in 1865, on the West Coast. There were 56 yellow fever cases, 28 cases of remittent fever, and 13 cases of febricula. In the report it is remarked that, in all probability, the cases of remittent fever and febricula were modifications of the more deadly disease.

If yellow fever is the acclimatization fever of West Africa, it means that every European has a mild attack of yellow fever contracted from native children or from his European friends, in the same way that he gets infected with malaria when not protected with quinine. It is strange, if this is so, that no fatal cases of yellow fever, or even typically mild cases, present themselves on the Coast for years. If we observe the behaviour of yellow fever in a town such as Vera Cruz, where the disease has been endemic for centuries, where the population is not large, and where immunity by mild attacks or recovery from severe ones must play an important *rôle*, we shall see that it is different from that which characterises the yellow fever in the towns of West Africa in which Sir RUBERT holds the disease to be endemic. In Vera Cruz the immunity produced by its continuous presence does not prevent a yearly prevalence and a large number of deaths. In other words, it behaves like other diseases in an endemic town. I have a considerable experience of cholera in an endemic town, and the statistics show always a yearly toll of fatal cases.

Possibly there is an acclimatization fever in West Africa, but there is no reason to suppose that this is yellow fever more than one of the many unclassified fevers. It is well known that many organisms introduced into the system will give a comparative immunity from other diseases with which they are not connected. There is one important fact which I should like to mention. The Medical Department of the Admiralty kindly furnished me with a list of the yellow fever cases that have occurred in the Navy since 1880, and I find from this list that though there have been small outbreaks of yellow fever on the warships on the West Indian stations, there has not been a single case of yellow fever on any of the warships on the West African Coast during the thirty years that have elapsed. The crews have suffered from malarial fever from the vessels lying in the creeks and rivers, but there has been no case of yellow fever, or suspicious cases, and this though the crews have been subjected to the bites of the stegomyia, both on board ship and on the land. This

TABLE IV.*

VERA CRUZ.—YELLOW FEVER MORTALITY MONTHS.

Years.	Jan.	Feb.	Mar.	Apl.	May.	June.	July.	August.	Sept.	Oct.	Nov.	Dec.	Total.
1866	0	0	2	11	26	40	54	48	20	12	21	20	254
1867	18	4	16	54	64	42	8	32	38	17	11	8	312
1868	7	6	7	30	40	16	26	20	21	9	2	3	187
1869	0	0	0	2	0	0	1	1	2	1	2	0	9
1870	0	0	0	0	0	0	0	0	1	3	5	2	11
1871	3	0	1	6	29	113	71	17	10	15	2	4	271
1872	2	2	4	5	14	45	53	39	29	11	5	6	215
1873	1	0	0	3	1	19	58	59	44	20	10	7	222
1874	1	2	0	0	2	3	11	24	7	12	11	6	79
1875	7	2	4	11	29	93	118	105	41	13	2	0	425
1876	0	1	1	0	0	2	4	7	9	6	1	3	34
1877	0	1	0	0	4	7	54	144	164	77	50	27	528
1878	16	5	0	1	7	58	113	110	62	45	24	7	448
1879	6	4	2	1	1	1	2	1	3	0	0	0	21
1880	2	0	1	0	0	0	1	3	10	42	92	103	254
1881	28	21	27	29	94	235	183	39	22	25	17	3	723
1882	1	1	2	1	5	11	7	14	8	3	5	12	72
1883	5	3	7	16	90	261	200	67	39	31	21	7	747
1884	3	2	0	0	3	2	4	3	17	44	39	19	136
1885	6	5	8	5	21	25	84	84	48	19	14	9	328
1886	7	3	7	12	18	31	19	26	25	37	13	10	208
1887	0	0	1	0	0	1	0	0	1	1	0	0	4
1888	0	0	0	0	0	0	0	0	1	2	0	0	3
1889	0	0	0	1	0	0	0	0	0	0	1	0	2
1890	0	0	0	0	0	1	1	5	0	6	9	19	41
1891	1	4	2	3	10	39	40	19	13	18	20	10	179
1892	0	2	1	7	20	41	75	53	27	13	10	10	260
1893	5	1	6	8	17	32	29	8	9	11	5	0	131
1894	0	0	0	8	39	55	44	38	15	5	3	3	210
1895	5	1	1	2	12	23	40	36	17	3	3	0	143
1896	0	0	0	0	0	0	0	0	0	0	0	0	0
1897	0	0	0	0	0	0	0	0	0	1	1	0	2
1898	0	0	0	0	0	0	0	9	24	39	32	23	127
1899	9	5	7	8	101	246	90	68	31	4	5	7	670
Total	133	75	107	224	647	1442	1390	1079	759	557	436	328	7156

* The figures are quoted as published, although some of the totals are not correct. This, however, does not affect the general statement, and there are no data by which to check them.

is a very different history from the early period of the nineteenth century when the hunting for slavers was active, and when the prize crews were

brought to Sierra Leone. It is from this early period that Sir RUBERT draws his illustrative cases, and there can be little doubt, then—in fact, it was acknowledged— that yellow fever was endemic in Sierra Leone, and it was recognised also that during an outbreak there were mild cases of yellow fever as well as the more numerous fatal cases. But the question at issue now is: Is Sierra Leone still an endemic centre, and are the Coast towns—which Sir RUBERT BOYCE has shown us as possessing abundance of stegomyia—endemic centres now, or have they ever been?

The outbreak at Sekondi lends support to the view of newcomers being more liable. The first suspected case of yellow fever had only been nine days in Sekondi, and the two longest seven and fifteen months respectively. A different interpretation from acclimatization must however be put on this, for as a matter of fact the majority of those attacked and who died had been on some part of the Gold Coast for years, and were attacked because Sekondi had recently become infected. Of course it may be contended that they lose their acclimatization immunity by their periodical visits to Europe, but that only renders the acclimatization theory more difficult of explanation. Then as regards natives they are susceptible to the disease when exposed to the infection. In the Sekondi outbreak there were ten deaths among Europeans and three deaths among natives.

When yellow fever is introduced into a city containing negroes, it is acknowledged that during an epidemic the natives take the disease usually in a mild form or escape altogether. This was the experience of New Orleans, and was attributed to their thicker skins and their strong *bouquet d'Afrique* smell which appears to have been too much for the stegomyia.

In conclusion, while offering these criticisms to Sir RUBERT BOYCE'S views, I think the question raised is so important that it is one well worthy of a Scientific Commission to thoroughly investigate the subject. It is one that cannot be left as it is, and ought to be investigated. In the meantime, the systematic and regular destruction of the stegomyia is urgently required, and will meet both views.

Dr. CHARLES R. CHICHESTER: When it is considered that I have been nearly fifteen years on the Coast and have fought an epidemic of yellow fever, perhaps some little importance will be attached to my opinion. If Sir RUBERT'S contention, that yellow fever is always with us, is

correct, then far more energetic measures for exterminating stegomyia must be adopted in the future than have been proposed as a result of his visit to the Coast. Only those who have had to deal with such questions know the difficulties which confront the sanitary officer in his attempts to rid a place thickly inhabited by a mixed population. Separation of whites from blacks is the first and most important measure, but the mere finding of larvæ inside the premises should be punishable. As I understood from Sir RUBERT, yellow fever is always with us, is kept up by being transmitted from native to native, causing a disease not as yet diagnosed, and breaks out in severe epidemic form among the whites from time to time and often at very considerable intervals. We always, however, have it among the Europeans in isolated, undiagnosed, more or less severe cases. This is a startling proposition. How comes it that, with a fairly large non-immune European population, living (as in Lagos, Bathurst, Sierra Leone and elsewhere) among and surrounded by natives, epidemics are not more numerous? An isolated case of a strange disease here and there may not attract much attention. But if a second presents itself soon after, having much the same strange symptoms, doubt and anxiety are at once aroused. Personally, whenever I have had a serious case, I have always called in other opinion, where it was possible to obtain it, and it is always possible in coast towns of any size. I fancy that this is always done, and it does not seem likely to me that a second case thus attended will die without suspicion having been aroused, supposing it to be yellow fever. Sir RUBERT thinks that there is a "vast amount of mistaken diagnosis." I cannot believe this. We are all on the *qui vive* for yellow fever, which has been a yearly menace, for many years, from the French Colonies. When the disease has shown itself in epidemic form, it has, I think, been promptly diagnosed. In the Gambia, in 1900, I detected, I believe, the very first case, and notified the Government of my belief; and on the Gold Coast this year the disease was, I believe, promptly diagnosed. We do not need such signs as intense jaundice and black vomit in order to diagnose yellow fever, and do not wait for such symptoms. In the Gambian epidemic jaundice was not marked, and black vomit was markedly absent. One I know died, vomiting blood into my face, and I think a second had black vomit; but in the others—if my memory serves me—it was absent, and it was a very severe epidemic, 86 per cent. of my

cases dying. To assert that there has been an universal conspiracy to deny the presence of yellow fever is a very grave assertion to make. What possible reason can the medical officers have for cloaking the disease? The responsibility on their shoulders is dreadful. I can well remember how I trembled like a leaf when I thought, in the pre-mosquito theory days of 1900, of the terrible ordeal I had to go through unaided, and of the deaths that would take place if I did not promptly turn the Europeans out of the place. The responsibility of placing the colony in quarantine was a trifle. Supposing I was wrong, I would lose my post; but what was that compared to the lives that would be lost if I neglected my duty. The two cases mentioned by Sir RUBERT (in 1884 and 1903) are regrettable. In the first case, it was one opinion differing from another on a single case (Sir RUBERT does not mention if an epidemic followed). The second case certainly looks bad; but the two hardly seem to warrant Sir RUBERT'S conclusions. The executive authority must be, as I can well believe, slow to place a colony under quarantine, but I cannot imagine that it has ever refused to do so, once satisfied by the Medical Department of the existence of yellow fever. Sir RUBERT maintains that we err, in being unable to differentiate between yellow and other fevers—such as "bilious remittent," "inflammatory," and other fevers. "Inflammatory or seasoning" fever I know nothing of, and am not the least aware that it is even considered necessary for Europeans to have a "seasoning" or any fever. "Bilious remittent" is to my mind very different from yellow fever, and I am inclined to think that Sir RUBERT, in his anxiety to prove his point, classes as yellow fever cases of bilious remittent fever, in which, owing to the persistent and violent attacks of vomiting, black vomit has been present. The "yellow fever" of the natives I know well. It startles you at first when a native comes to you and says he has "yellow fever." It is a mere bilious attack, it is not yellow fever.

Dr. C. F. HARFORD: Sir RUBERT BOYCE is, I think, very heartily to be congratulated upon introducing to the notice of the Society a matter of the greatest practical importance, and, whether we agree or disagree with his conclusions, no one can doubt that the subject is one worthy of most serious attention. It should be remembered that the discussion is not of mere academic interest, but has become of

particular urgency owing to the recent outbreak of yellow fever in West Africa, which has led to the loss of valuable lives. Nor has Sir RUBERT raised the question as an irresponsible investigator, but he comes before us as one officially charged to inquire into a serious epidemic, and the views which he has put before us are those which he has deliberately adopted after painstaking inquiry.

There is some danger lest the suggestion of some blame, which may be attributed in the past to medical practitioners working in West Africa, should obscure the main points at issue, but in my opinion the facts of the case may be explained without attributing to the medical profession on the coast either an attempt to conceal unpalatable truths, or ignorance in diagnosis; and until this is definitely proved, it will be only just to give them the benefit of the doubt. When it is remembered that there is no absolute scientific test of the diagnosis of yellow fever, there is every excuse for failure to recognise the disease where, it is not believed to be endemic, unless several characteristic cases are met with at the same time. Let us now recall the facts which Sir RUBERT has put before us. Well-recognised outbreaks of yellow fever have occurred every few years in West Africa, whilst other epidemics, which were probably of the same nature, have occurred more frequently. No evidence is available to indicate that these epidemics have arisen as a result of infection brought from any of the well-known yellow fever centres; yet, unless this can be proved, there remains only the conclusion that the disease must be endemic in West Africa. He has pointed out that there are a number of titles given to fevers acquired in West Africa, the true nature of which is distinctly doubtful; and in particular he instances that which is the most unsatisfactory of all, the so-called bilious remittent fever. He finds that this name is given to fevers varying greatly in character, and many of them bearing striking similarity to the experimental yellow fever, of which he has given us notes of certain cases. The only evidence which I can bring forward to illustrate this point, relates to an epidemic which took place at Lagos in January, 1894, in which six missionaries died within the month, as well as other Europeans, and in which other missionaries were also ill. The facts are as follows: A party of Missionaries arrived in Lagos on December 13th, 1893. Some of them were going to the Lagos Hinterland, some to Lagos itself, but the majority were only staying in Lagos,

en route for the Niger. They all seem to have arrived at Lagos in good health, and those who proceeded up country remained well, but most of the others, together with some of the Missionaries already resident in Lagos, were taken ill, and of this number six died within the month of January. There seems to have been a good deal of exceptional illness even outside Missionary circles, and the harbour master, Captain S., is said to have died of "hæmaturic fever." On January 1st it was reported that the Rev. F. G. T., a missionary who had been resident in Lagos, had been ill for several days with "fever," but the symptoms were evidently slight, and on that day the cases of serious illness commenced. These may be briefly summarised from the information at my disposal, though in the main I am dependent upon non-medical reports.

Bishop Hill, æt. 42, taken ill January 1st, 1894.

Tuesday, January 2nd.—Dr. ROME HALL said he was not alarmed at the fever, but at the state of his heart, stating that his "quick breathing indicates great weakness of heart." He found also enlargement of the spleen.

January 3rd.—Grave anxiety during the day, mainly on account of the stupor in which he lay and the weak action of the heart. Began to perspire 4 p.m., and since then has slept quietly.

January 4th.—Very ill all day with retching and vomiting. Hæmaturia said to have set in—a violent attack of hiccough early in the morning, followed by other attacks during the day. Delirious during the evening, endeavouring to get out of bed.

January 5th.—Died at 4.35 p.m., after hours of terrible agony. He lay tossing all the previous night, rapidly losing strength as one attack of hiccough followed another. He did not regain consciousness.

Mrs. Hill.—Taken ill on January 2nd, reported to be vomiting badly.

January 5th.—Died at midnight, having been unconscious for two days.

Miss M., æt. 41, fully-trained hospital nurse, a member of Bishop Hill's party, taken ill on January 1st with fever. It does not seem to have been so serious an attack as in the case of her companions, but that it was much more grave than an ordinary

attack of malaria may be judged from the fact that she was at once invalided home, and from the medical certificate which read as follows:—"Anæmia, dropsy, tropical fever with temp. up to 103 Fah., followed by prostration, with pulse-rate ranging from 50—55 a minute, and metrorrhagia."

Rev. J. V., æt 33.—A missionary residing in Lagos.

January 13th.—Stated to be far from well.

January 15th.—Started with fever. 4 p.m., temperature 103.

January 16th.—Temperature still 103, vomiting and straining a good deal.

January 17th.—Temperature 101, having had a restless night and retching constantly.

January 18th. — Temperature lower, but still very restless. 10 p.m., distinctly worse.

January 19th.—Somewhat better, but only able to take nourishment by enema.

January 20th.—Worse in the early morning, vomiting terribly, unconscious soon after, and died at 11 a.m.

Miss M., æt 24.—One of Bishop Hill's party. Taken ill with fever January 17th. Temperature 102·5. Fever appears to have continued, and on January 21st was reported to be very weak, and greatly depressed. January 22nd she was said to be better, but at midnight sudden collapse set in and she died.

Rev. E. W. M., æt 24.—One of Bishop Hill's party. Taken ill on Sunday evening, January 14th, on board ship in the Forcados River. January 15th, early in the morning, the temperature was 103, and never after that fell below 100. January 17th, is stated to have developed pneumonia, with very rapid breathing, and repeated attacks of hiccough. At 4.30 his temperature was 103, and he became delirious, and struggled violently, managing to get out of bed. During the struggle he brought up a mouthful of blood, and and vomited mouthfuls of blood several times afterwards. By this time his temperature was 105, and he was put in a wet pack, but without any effect on the temperature, and at six o'clock he died. His death was certified by the doctor as due to "malarial fever."

Rev. A. E. S., æt 24, one of Bishop Hill's party.—Taken ill with high temperature on January 3rd at Lagos. Does not seem to have

been seriously ill, and was well enough to leave Lagos for the Niger with two fellow missionaries on January 14th. Was taken ill again on January 15th, but was not so seriously ill as the previous case. He, however, rapidly became worse, and died on board ship on January 21st.

This again was certified by the doctor as a case of "malarial fever," but it is recorded that those on board ship were much struck by the peculiarly malignant type of fever in each case. No rallying ever took place.

There can be little doubt in the minds of anyone who considers these cases that the epidemic was not one of malarial fever of any sort, and no other fever that we know would fit in with the circumstances of the case, except yellow fever. It remains, therefore, to consider how the epidemic started. It cannot easily have been brought by the party who arrived on December 13th, since the first date on which any of the party were taken ill was January 1st, and it is clear that there had been illness in Lagos of a serious character previous to their arrival. It is also remarkable that those who had not remained in Lagos, but who immediately went up-country, entirely escaped the epidemic. It is probably the case that Bishop Hill's party suffered so severely because they had so recently arrived from England, and they had no chance of being immunised in any way, and had it not been for this fact and the heavy mortality no suggestion would probably ever have been made that this was an outbreak of yellow fever and it is only in looking back and carefully studying the facts that one is led to the diagnosis in this instance. I may say, however, that I have formed this opinion for many years past, and I recently had the opportunity of discussing the matter with a doctor who was in Lagos at the time, and he agrees that the epidemic was undoubtedly yellow fever.

I am, therefore, inclined strongly to support the view which has been expressed by Sir Rubert Boyce, though I consider that it would be as great a mistake to put down all uncertain cases of fever as yellow fever as it has been in the past to class these as malarial fevers. My impression is that it will be found that other diseases—such as relapsing fever and Malta fever—will be found in West Africa, and possibly even kala-azar, and trypanosomiasis is certainly present in West Africa.

It is a strange thing that sporadic cases should seem to develop of

diseases ordinarily taking an epidemic form, but it is well known that sporadic cases of sleeping sickness are found in various West African Colonies, whereas there is no evidence of any serious epidemic.

I can corroborate the statement made by Sir RUBERT as to the great fear of yellow fever, and the odium which is likely to attach to any medical officer identifying a case of the disease; and considering the uncertainty of diagnosis of yellow fever, it must always be a grave problem as to the duty of a medical officer where yellow fever may be suspected, but where no absolute proof exists. Whilst, therefore, there may have been excuse in the past, we must take care that there is no excuse for any such uncertainty in the future by a better understanding of the diagnosis of yellow fever. I do not agree that the making known of Sir RUBERT'S opinions is likely to do harm. It is possible that some may be frightened, and it is well perhaps that they should be frightened, for then, perhaps, we shall see adequate steps taken to deal with the mosquito question in our West African Colonies. I hope that this may be the result of the discussion, and that the Government responsible for these Colonies will not rest satisfied until the fevers of West Africa have been more fully investigated, and every known precaution utilised to the best possible advantage.

Dr. C. W. DANIELS asked for an adjournment, as the discussion was an important one, and could not be fairly carried on in the absence of Sir RUBERT BOYCE. It was decided, however, to continue the discussion, and Dr. DANIELS proceeded with the following remarks: One of the chief difficulties of this subject lies in the distinction between *mild* forms of bilious remittent fever and *mild* forms of yellow fever. The differential diagnosis of severe forms is easy, and CLARKE of Dominica, for instance, writing in 1793, gave almost the same differential points as had been given that evening by Dr. TULLOCH. It seems to me that it is a common error to assume that bilious remittent fever is a mild fever, ranking in severity somewhere between malaria and yellow fever. Bilious remittent fever is often a very severe form of fever, more dangerous even than blackwater fever, and this was not the impression received in listening to Sir RUBERT. Amongst the cases mentioned by Sir RUBERT BOYCE, some had not one single characteristic symptom of yellow fever, and it is possible that these were not yellow fever at all. The occurrence of

mild forms of yellow fever have always been recognised; so that this is no new discovery, and cases of this kind have been reported constantly during the past hundred years. The prevalence of "fever" amongst natives at times when yellow fever has been present among Europeans has been commonly noticed.

Again, CLARKE of Dominica, in his account written in 1792, mentioned that not only West Indian negroes were affected, but also freshly imported West African slaves. For instance, in that epidemic amongst a gang of twenty-four negroes fresh from Africa, all were attacked, and one-third died.

Of course there have been a few who have contested the view that there is a distinction between yellow fever and bilious remittent fever, but the dissentients almost invariably were passing visitors who had not had prolonged clinical experience of the two diseases, whilst resident practitioners nearly everywhere have regarded yellow fever as an entirely distinct disease. Dr. PICKARD, a visitor, who combined the important office of Deputy Inspector-General of Her Majesty's Forces and Physician to Bloomsbury Dispensary, formulated definite views in which he said that he "could trace and show every intermediate form between bilious remittent fever and yellow fever," and considered that there was less difference between them than between simple and confluent small pox. He hedged a little afterwards, as he advised people not to visit places in the West Indies where yellow fever was diagnosed. This brings one to the important point in Sir RUBERT BOYCE'S work which has attracted most attention, namely, the contention that yellow fever is endemic in West Africa. We are too apt to consider that an epidemic begins with the first severe case, and that when the last severe case has been noted the epidemic is over; but the probability is that the outbreak commenced before the severe forms were noted. There may or may not have been some mild cases before the first severe case, and after the last noted severe attack there may or may not have been a continuance of mild cases. Sir RUBERT BOYCE stated that outbreaks were simultaneous in several places, and asked how this could be explained except by assuming that the disease was endemic in Africa. I think that the true explanation lies in the fact that no one could tell when an epidemic began and when it ceased. In any case the simultaneous character of the outbreaks in various parts had not been

proved, only that it had been recognised at the same time in different places.

As regards the difficulty of diagnosis, it is well known that mistakes are made in all epidemics, as the experience of fever hospitals shows. In this respect one could substitute relapsing fever for yellow fever and bilious remittent fever, and one could also show that mistakes had been made in a contrary direction, and find bilious remittent fever diagnosed as yellow fever. Nor is this the case only in the tropics; in any new disease one was liable to make mistakes in diagnosis. It was some little time before the plague was recognised as such in this country in the outbreaks in the north, but when it had been recognised it was apparent that cases had been occurring some time before, and it was quite easy to trace them back. If a disease so easily diagnosed as plague had been overlooked, one could not be surprised if yellow fever was incorrectly diagnosed.

One could not, of course, object to Sir Rubert Boyce advancing his hypothesis had there been any adequate foundation for it. Unfortunately he appears to have brought it forward without proper consideration or thorough realisation of the serious effects which would logically follow were it adopted. For instance, if yellow fever were to be considered endemic throughout West Africa—and on similar grounds throughout the West Indies—this would mean that in every country where stegomyia existed and no yellow fever, a permanent quarantine should be established against Africa and the West Indies. It would completely shut off West Africa and the West Indies from the rest of the tropical and sub-tropical world, and the Canaries, the only health resort adjacent to West Africa, would refuse to allow patients to land from that part. Moreover, if yellow fever were declared to be endemic throughout West Africa, every administrator would ask, "Why take any trouble about quarantine at all? What is the good of quarantining against Sierra Leone if in our own town yellow fever is endemic, or if the disease is all the time present among our native children?" This is a disastrous issue to contemplate, when it is remembered that in the West Indies quarantine efforts have been very successful, even before the proper theory of the disease was known and the system of quarantine was imperfect. Quarantine has been our first line of defence. By all means exterminate stegomyia, if possible, in the same way as one would

rats to prevent the spread of plague, but do not let us neglect other measures.

I attach so much importance to this point, especially in view of the fact that Sir RUBERT BOYCE'S statements have appeared in the lay press, that I think it is imperative that the Society should give an expression of its views, and state whether or not it supported Sir RUBERT BOYCE'S theory, and this more especially for the sake of those who might hereafter be called upon to take practical action in the prevention of yellow fever.

Referring to Dr. HARFORD'S remarkable series of cases amongst missionaries, he admitted that on the notes given it was not possible to be certain as to the diagnosis, but these cases did not show any definite symptoms of yellow fever, either severe or mild. I do not, therefore, consider that they are admissible as a proof of the existence of endemic yellow fever, as it cannot be proved that they were actual cases of that disease.

On the motion of Dr. CARNEGIE BROWN, the discussion on Sir RUBERT BOYCE'S paper was adjourned until the next meeting of the Society.

TROPICAL DISEASES IN BRITISH NEW GUINEA.

By R. FLEMING JONES, M.D.,

Government Medical Officer, Samarai.

British New Guinea, or the Territory of Papua, as it was officially styled when it became a Territory of the Australian Commonwealth some three years ago, comprises the south-eastern fourth of the great island of Papua or New Guinea, with the islands to the south and east thereof. The corresponding north-east fourth, with its islands, belongs to Germany and the western half of the island to the Dutch. The area of the British territory is about ninety thousand square miles, by far the greater part of which is unexplored. This is also the case as regards the German territory, while of the interior of Dutch New Guinea practically nothing is known. The British territory lies between 5 and 11 south latitude. The native population has been variously estimated at from 300,000 to 3,000,000, but there is no foundation whatever for a reliable estimate. The natives are Papuans, ranging in colour from sooty black to chocolate brown, with huge mops of frizzy hair, and varying much in physique, some of the eastern islanders being quite dwarfish, while the natives of some other districts are well up to the European average in stature. In some places, especially along the western coast, there is an admixture of Malay, and on the eastern coast and among the eastern islands, of Polynesian blood, but the Papuan type predominates everywhere. Except where they have been brought in contact with Europeans for some time they are naked cannibals, literally still in the stone age, although they cultivate gardens and have fixed habitations, on the earth or in houses built in trees or on piles in the sea.

The climate is hot and humid along the coast line, the annual mean at Samarai being 79·5, humidity 80, but quite bracing in many parts of the interior, where the peaks of the great mountain ranges rise to heights of over thirteen thousand feet. Throughout Australasia the climate of New Guinea is regarded with terror, and the country has much the same reputation, in the antipodes, as the West Coast of Africa formerly enjoyed among ourselves. This idea is certainly not borne out

by the facts of medical observation, for, considering its geographical position, it is singularly free from many of the diseases which are common in other countries within the tropics. I believe that a certain confusion exists in the popular mind owing to the similarity in names between New Guinea and the Guinea coast of Africa; and the disastrous results which have followed when the discovery of a new gold-field has caused a sudden influx of miners, ignorant and careless in matters of Tropical sanitation, have only tended to confirm this unfavourable impression.

The total European population is about seven hundred. Of these, one-fourth are missionaries and their families, another fourth Government officials and their families, and the remainder miners, traders, planters, etc. Alluvial gold-mining is the principal industry of the country, most of the miners coming from Australia and all employing native labour, which is under Government control. Cocoanut and rubber planting is becoming important.

There is a remarkable absence of large wild animals, the pig, wallaby, and a harmless animal similar to the Australian bear being all that are known. Alligators, however, infest the rivers. The most striking feature about the fauna of the country is the immense number and variety, even for the Tropics, of gay-plumaged birds, chief among them being the bird of paradise in all its varieties. Whether the absence of wild animals has any connection with the comparative rarity of tropical disease is a question which is perhaps worthy of consideration. It probably accounts, to some extent at least, for the universal practice of cannibalism among the natives. Pigs are treated with great consideration and are only killed for great feasts. It is quite common to see, in a native village, a woman suckling a little pig at one breast and a baby at the other. The bodies of prisoners captured at war appear to the natives as natural supplies of animal food, which it would be folly to waste.

There are only three qualified medical men in the territory. One of these is a magistrate, so the medical staff consists of only two qualified men, one of whom is stationed at the oldest settlement and seat of Government, Port Moresby, and the other at the larger and more modern settlement of Samarai, which is the distributing point for the goldfields, and the place where three-fourths of the native labour recruits pass their examination. There are hospitals at both places, and the

three native hospitals at Samarai—general, gaol, and special or lock—usually have about seventy inmates. The ordinary difficulties of medical work in such a country are accentuated by the multiplicity of dialects, or rather, of languages. Until recent years there was very little intercommunication between villages—the hand of every village was against all its neighbours—and the people from villages only a few miles apart are often quite unable to communicate with one another by speech, even now. This difficulty is becoming less as time goes on, but constitutes a great impediment to our work, as interpreters are few and utterly unreliable. A few days ago I showed a very typical case of yaws to six of the patients in the native hospital here and asked each for his name for the disease. These six boys all came from within a radius of fifty miles from Samarai, and I got five different names for yaws.

Among Europeans, malaria and dysentery, with their complications, are the important tropical diseases met with. These are also common among the natives, although malarial manifestations are usually milder than in Europeans.

I collected specimens of mosquitoes from seven different places in the eastern half of the territory, including two of the outlying islands, and submitted them to Professor THEOBALD when I was in England last year. The only anopheles present was the *Cellia punctulata*, DONITZ, and this was found among specimens from all the seven places. This insect has been shown to be a malaria-bearer in German New Guinea. I have recently come across another mosquito with the same wing marking as *Cellia punctulata*, but with banded legs, and have forwarded some of these to London. I do not know of any efforts having been made to identify the malaria-bearing mosquitoes in any other part of the country.

Malaria is common along the coast line and along the river valleys throughout the territory. There is considerable malaria on the goldfields, which are from 500 to 1,500 feet above sea level, and from 50 to 80 miles from the coast. I have never succeeded in getting a specimen of anopheles from any of these places, and, as far as I can learn, they are not to be found. The miners come to Samarai once a year, to pay off their labourers and get others, and generally also to get medical advice. Most of them stay here for a month or two, enjoying themselves after their own fashion, and when they return to the fields they

generally spend a week or more at the point on the coast at which they land, before starting on the journey inland. Before arriving at their destination, or soon after, they often develop malaria. Of course this was contracted on the coast, but it is difficult to make these people realise this, and still more difficult to get them to take precautions while in the danger zone. Instead, they triumphantly point to these attacks of fever as evidence of the weakness of what they call "the mosquito theory." It is only fair to say that there are exceptions among them. Inefficient treatment, usually by insoluble preparations of quinine in bullet form, results in a condition of chronic malarial poisoning which lasts until the next visit to Samarai or until the man dies. It is principally among these men that blackwater fever occurs. Occasional cases of this condition are also seen in traders, missionaries, etc., but only in those who have lived similar lives, as far as malarial infection and inefficient treatment are concerned.

The simple tertian and æstivo-autumnal or tropical types of malaria are found in about equal proportions. Pernicious attacks are rare, especially among natives. I have never seen a case of quartan fever here, or heard of one anywhere else in British New Guinea. In this connection, an interesting and suggestive fact was mentioned to me by the Medical Officer at Friedrich Wilhelmshafen, in German New Guinea, whom I saw while on my way home last year. He stated that on a group of islands about a hundred miles from that port, known as French Islands, on which there is a German population of eight, the quartan was the only type of fever known. This type of malaria has not been observed at Friedrich Wilhelmshafen where the parasite of tropical malaria abounds.

Considering the doubt expressed by high authority as to the connection between malaria and blackwater fever, I feel some diffidence in making any suggestion, but, in every case which I have seen in the past five years, the patient had suffered from many attacks of æstivo-autumnal or tropical malaria, produced by the so-called malignant tertian parasite, in the clinical manifestations of which infection it requires a very vivid imagination to discover anything tertian at all. Repeated attacks of this irregular fever, improperly treated, have preceded the attack of blackwater fever, the exciting cause of which, in several cases, has apparently been a dose of quinine.

This pre-existing condition of long-standing malarial infection agrees with my experience of blackwater fever in various parts of the tropical world during the past eighteen years, and it has occurred to me, in view of this experience, that in the comparatively rare instances where blackwater fever has occurred soon after the arrival of the patient in a tropical country, some other condition tending towards hæmolysis might reasonably be assumed to exist. Of course, this is pure assumption, but as a working hypothesis it is useful, for it seems necessary to give a long-continued course of anti-malarial treatment if a recurrence is to be prevented. In the last twelve cases which I have seen I have only found parasites—the small ring form—in two instances; but one would hardly expect to find them often. All of these twelve patients have recovered, the treatment having been by saline solution. Quinine has been cautiously given, in solution, as soon as the urine became clear, and in two cases appeared to cause a return of the black urine. It seemed that, the reaction having not yet taken place, the hæmolytic influence was still dominant and was increased by the quinine. Since using the normal saline I approach a case of blackwater fever with much more confidence than I did previously. I have been applying the principle of Murphy's method of proctolysis, and have very rarely had to resort to subcutaneous or intravenous injection. The improvement in the general condition of the patients and the lessening of the discomfort and distress have been very striking. A steady effort is being made to induce people, when away from medical assistance, to take quinine in some easily absorbable form. I think the insoluble, bullet-like tablets, which are found in nearly every tropical medicine chest, are responsible for many deaths every year. It is not easy to get people to believe that these things, especially the sugar-coated ones, are veritable instruments of homicide, but a convincing argument is to demonstrate them in the bed pan, and I have found that this can be done in most severe cases of fever.

In reading the histories of cases of tropical disease we continually meet with the bare statement, "the patient had been taking so many grains of quinine daily." In the absence of any information as to the form in which the drug had been administered, such a statement is distinctly misleading, as there is nothing to show whether or not there was any probability that the patient had absorbed any quinine at all.

This seems to me to be a matter of real importance. The vexed question as to the relationship between quinine and blackwater fever is a case in point.

Samarai itself affords a small contribution to the evidence showing the value of anti-malarial sanitation. It is an island, only sixty acres in extent, situated two miles from the mainland, and was formerly a most malarial little spot owing to the presence of about eighteen acres of swamp. This was treated by filling-in and draining, and the filling-in was repeated whenever necessary. For three years and a half, before I went on leave in April, 1908, I had not found an anopheles on the island or seen a case of malaria which had originated in the place in that time. While I was away there was an exceptionally heavy rainfall and some breeding places were formed, in which I found anopheles larvæ on my return. Malarial fever, both simple tertian and the irregular type, was very much in evidence among the one hundred Europeans and two hundred natives forming the population, but the filling-in was attended to at once with the result that new infections gradually became fewer and fewer. It will be a long time, however, before recurrences cease to appear among those who became infected at this time, as it seems to be impossible to make some patients continue to take quinine for the necessary length of time. If this experience shows the value of anti-mosquito work, it also indicates that, in such matters, "Eternal vigilance is the price of safety."

Sporadic cases of dysentery are occasionally met with, but bacillary dysentery occurs in epidemic waves and usually appears simultaneously at several widely separated places. In some instances, it is possible to trace a connection between the different outbreaks, but not always. Some people have indulged in meteorological, telluric and similar theories to account for these periodical outbreaks, and it seems possible that meteorological conditions may at certain times be especially favourable for the growth or increased virulence of the causative organisms, but I think it is quite likely that the element of contagion is really the important one. Natives are recruited for mining and plantation work from all over that portion of the country which is more or less under Government control, which includes most of the coast line and the eastern islands. The recruited boys are often working at places hundreds of miles from their villages, and time-expired recruits

are continually being returned to their homes. Their return is celebrated by feasting, when the natives gorge themselves on pig and other Papuan delicacies. Among the returned boys are often those who have suffered from dysentery while away, and some of these may be carriers of the Shiga bacillus, or one of the allied organisms, for the renewed activity of which the conditions are thus made favourable. This does not explain, however, why in some years one should hardly hear of a case of dysentery in the country, and here is where the meteorological theory seems to come in. The disease is very fatal among the natives who soon become convinced that evil influences are at work against which it would be futile to rebel. The village water supply is generally from creeks, which soon become infected, and in the complete absence of sanitary measures, the only hindrance to the spread of the disease is the scattered nature of the population.

Dysentery has not been epidemic in Samarai, at least not in the last seven years, although cases are frequently brought in to the native hospital, where proper precautions are taken. The water supply is derived from tanks, and with an annual rainfall of 120 inches, is abundant. All garbage is burned daily and flies are very rarely seen. At Port Moresby there have been several epidemics during that time. The water supply, also derived from tanks, is scanty, as the rainfall is only 35 inches, and there is a long dry season when flies are numerous.

A fairly clear case of infection through contaminated food occurred here recently. The hospital for venereal diseases is on a small island a mile from Samarai. The native attendant at this hospital and his wife belonged to a village some thirty miles away where dysentery was prevalent. They had not been to their village for at least six months. Some of their relatives sent them a basket of bananas, yams and other native food. This was delivered to one of my boat boys, the messenger himself not visiting the island, and was taken there in my whaleboat on my next daily visit. In a few days the attendant and his wife, and the only patient whom they had invited to share the food, all developed dysentery, and the two former died. The cases were isolated, the stools disinfected, and no further cases occurred among the forty patients in the hospital. The deaths were partly due to the fact that the attendant and his wife heard that their relatives were dying in their village, and as soon as they became sick they made up their minds that they were doomed also.

I have not seen or heard of a case of abscess of the liver in a native during the five and a half years of my service here, but I know of two cases in Europeans during that time.

Beri-beri has several times appeared amongst the natives working on the alluvial gold-fields and as carriers to and from the coast. Until two years ago these natives were being fed on rice of an inferior quality. No definite relationship was established between the rice and the disease, but there has been no beri-beri for the past two years, during which time the quality of rice imported has decidedly improved. Most of the deaths occurred on the fields where there is no medical man. The diagnosis was therefore made by laymen in these fatal cases, but a sufficient number of cases were brought to Samarai for there to be no doubt about the existence of the disease. As the Government contemplated closing the auriferous area to native labour, and the existence of the industry was thus threatened, many hygienic measures, such as the enforcement of cleanliness, some attempt at the proper disposal of sewage, disinfection of the ground by the burning of grass, etc., were instituted at about the same time as the appearance of the improved quality of rice. As these natives are only engaged for a year, the boys who were fed on the better quality of rice were also working under better general conditions than their predecessors.

Ankylostomiasis has not been found in British New Guinea, although examinations of the fæces have been made in suspicious cases, both here and at Port Moresby. This condition is quite common in North Queensland, and the Medical Officer at Friedrich Wilhelmshafen, German New Guinea, informed me that of his patients in the native hospital there, who are nearly all labourers on plantations, ninety per cent. were infected. Friedrich Wilhelmshafen is the first port in New Guinea touched at by the North German Lloyd steamers running from Hong Kong to Australia, and there are, and have been for many years, many Chinese employed on the plantations in the neighbourhood. It was thought not unlikely that the infection had been brought along this route. Chinese have not been admitted to this territory.

Elephantiasis is quite rare among Papuans. Night examinations of the blood in the Samarai native and gaol hospitals have shown, at different times, from three to six per cent. of *Filaria nocturna* infections. More than three thousand natives come under my observation every

year, and I have only seen twelve cases of elephantiasis since I have been in the country. Nearly all of these twelve cases came from one district on one of the eastern islands, although the filaria-bearers in the hospitals were from all over the eastern portion of the territory, and I have heard of occasional cases of elephantiasis at other places. The condition is quite rare compared with its incidence in some other of the Pacific Islands.

The most striking skin disease among natives, owing to its great frequency, is *Tinea imbricata*. At least fifty per cent. of the eastern natives present this condition, and it is doubtful if they consider it a disease at all. They good-humouredly tolerate our efforts to relieve it, which they believe (and not altogether without reason) are the outcome of our peculiar notions of æsthetics. A thorough scrubbing with a weak lysol solution, followed by another scrubbing with soap and water and the application of an ointment of chrysarobin and salicylic acid is usually effective. The presence of the parasitic fungus appears to cause the natives no inconvenience, even when practically the whole surface of the body from the neck downwards is covered with scales. They dress their huge mops of hair with cocoanut oil and apply this to the face also, and I have never seen the scalp or face affected.

Yaws is quite common among the natives of the mainland, and seems to be spreading among the islands, where it has hitherto been unknown. This is, doubtless, one result of the freer intercourse which has followed the extension of Government influence. It was reported last year that a terrible form of venereal disease had appeared on a large island two hundred miles from Samarai. So alarming where the statements made that the Government yacht was sent to the island in question, with an officer on board, who was instructed to bring in as many patients as he could find to the Lock hospital here. The yacht returned with twenty-six cases of yaws, twenty-four patients being adults. From the enquiries made it was evident that the disease had only recently been introduced to this island, and this is borne out by the large proportion of adults in the batch of patients secured. The routine treatment is isolation, cleanliness and the local application of sulphur ointment, with the internal administration of iodide of potassium. The sulphur ointment is used as much with a view to preventing the access of insects to the yaws, as for any beneficial effect it may have on the eruption.

I have never seen any of the ulcerative conditions of the naso-pharynx which have been attributed to yaws in some places. A similar condition is met with in the Philippine Islands, where it is known as Gangosa. The etiological factor has not been determined, but it is not regarded as being connected with yaws. The *Spirochæta pertenuis* has been discovered in several cases.

It was stated in England some time ago, on the authority of a medical man who once spent a year in New Guinea, that cancer was unknown among the Papuans. At least three cases have been observed here during the last five years, and the diagnosis in these three cases has been confirmed at the Imperial Cancer Research laboratories. Another case, in which the diagnosis was made on the clinical evidence, disappeared before a specimen could be obtained. One of the cases was recently reported in the *British Medical Journal* on account of its rarity, it being a primary carcinoma of the liver in a boy of not more than sixteen. Considering the difficulties in the way of diagnosis, it is quite likely that some cases of malignant disease of internal organs are not recognised. Epithelioma certainly seems to be comparatively uncommon. Tattooing is extensively practised, and every native has scars of some kind about the body, in which keloid often develops. Not long ago I saw the most beautiful specimen of keloid I have ever encountered. A boy of about fifteen presented a well-raised purplish cuirass, completely encircling the thorax and extending, on one side, over the abdomen and below the groin, which was said to be the result of a burn received by falling in a fire some years previously.

The most rapidly fatal acute disease is pneumonia, which accounts for nearly one-third of the deaths in the native hospital. Natives suffering from pneumonia usually make up their minds, quite early in the illness, to die, and when a native reaches this frame of mind the prognosis is nearly hopeless in any condition.

Tuberculosis is quite rarely met with among Papuans, but not many of them have yet reached the stage of semi-civilisation.

Dengue fever has more than once been imported from Australia. *Culex fatigans*, which has been shown by GRAHAM, as well as by the American army officers in Manila, to be one at least of the dengue-bearing mosquitoes, is exceedingly common.

Stegomyia fasciata is also one of the commonest mosquitoes here,

and, with the opening of the Panama Canal almost in sight, assumes a position of serious importance. Why yellow fever has not been introduced to this side of the world before is difficult to explain. Although the ocean traffic direct from the home of yellow fever will be enormously increased and expedited when the Canal is open, there has been for hundreds of years no inconsiderable amount of intercourse between South and Central American ports in which yellow fever frequently occurs, and some portions of the Eastern Tropics. The *Stegomyia fasciata* is said to be a good traveller. It seems possible that something else, besides the recognised carrier and the germ, may be necessary for the disease to obtain a foothold. It is said to have been introduced into Africa many times, and yet does not seem to get any permanent hold there. In the present state of our knowledge, however, it is to be hoped that some means may be devised before the Canal is opened, by international agreement, whereby the Eastern world may be safe-guarded from the introduction of this pestilence, which would find awaiting it a non-immune population and the necessary mosquito from North China to Tasmania.

Venereal disease among the Papuans appears to be one of the results of intercourse with Europeans, and this implies that this class of disease is spreading. Four years ago the Government commenced a campaign against venereal disease, and special hospitals were established at Samarai and at one of the eastern islands, two hundred miles from here. This latter hospital was placed in charge of a Government officer, who had completed his medical course in England but failed to qualify. He reports that syphilis is quite common, and that he has seen cases of hereditary syphilis. The island on which his hospital is situated has a population of about eight thousand, and has been for generations a place where whaling and other vessels have been in the habit of calling. Things are quite different at the special hospital, Samarai, where not more than two per cent. of the patients suffer from syphilis. Gonorrhœa and soft sores, with every possible complication due to dirt, ignorance and neglect, are the everyday conditions encountered, and the fact that at least half of the eastern male Papuans have phimosis adds to the frequency of complications. That intractable condition, known as ulcerating granuloma of the pudenda, accounts for rather more than two per cent. of the cases at Samarai.

Venereal diseases are evidently new things to the eastern Papuans, for they rarely realise that they are venereal diseases at all, and they have no idea of what to do for them. For the ordinary diseases and injuries with which they are familiar they have some means of treatment, however crude and unsatisfactory these may be, but the expedients to which they have recourse in their efforts to obtain relief are often so extraordinary and harmful,—for instance, tying a string tightly round the root of the penis and leaving it there until gangrene set in, to relieve the pain of a chancroidal paraphimosis,—that they cannot have stood the test of experience.

Some few of the venereal patients come in voluntarily but most of the cases are discovered by magistrates while on patrol work and as their detection is associated, in the native mind, with crime and its punishment, there is no doubt that many cases are concealed. The special hospitals are keeping venereal diseases in check, to some extent, but it is not being eradicated and is not likely to be, especially as it is being continually reintroduced.

The influence of mind over matter is a very real thing with the Papuans. It is not uncommon for a native to die for no other reason than that he has made up his mind to do so. Several times I have seen a native, apparently unconscious and helpless, surrounded by a group of his or her sorrowing relatives who had already commenced the elaborate mourning which is customary and I have been able to find nothing to account for the condition. The application of a little liq. ammon. fort. to the nostrils has worked a startling change in the situation, but the native would have died without such treatment.

Typhoid fever has never been encountered in British New Guinea, but I have seen one case, in a European, of mild but continued fever, which appeared to be due to paratyphoid or similar infection, and I have heard of one other similar case which occurred about six years ago. In my case, it was impossible, owing to lack of facilities, to make the Widal test, but, clinically, the disease was not typhoid, even of a mild type. The patient, who was himself a medical man, had not been out of the country for some years. With the exception of these two cases, we have not, so far, met with any of those puzzling fevers of undetermined origin which are found in some places.

Quinine in Pregnancy: I usually give ten or fifteen grains of

sodium bromide with each five-grain dose of the bisulphate of quinine, as this seems to me to be a rational measure. I believe abortions are more often due to the fever than to the quinine, but in several cases in which abortions had previously occurred after the administration of the drug, I have used this combination with apparent success. Some missionaries who asked my advice on the subject, and who certainly have more opportunities of testing it on natives than I have, are quite enthusiastic about its effects. It is also useful in those very rare cases where patients suffer so much from various manifestations of nervous disturbance after quinine that they really cannot take the drug. I think most of such claims, however, have no real foundation, as in a very large proportion of them quinine can be given if the patient is unaware that he is taking it. I have met hundreds of people who said they could not take quinine, and many of them seemed to think their alleged inability to do so was a sort of moral attribute or an evidence that they were of finer clay than the common herd, but I do not think I have seen more than twenty cases in eighteen years in which the drug really caused serious symptoms.

ELECTION OF MEMBERS.

The following were duly elected as Fellows of the Society :—

Howard G. Barrie, M.D., Kuling, China.

Charles R. Chichester, M.B., Nigeria.

Arthur F. Cole, M.R.C.S., Ningpo.

Captain A. E. Hamerton, R.A.M.C., London.

Edward Hicks Hume, M.D., Yale Mission, Hunan.

Thos. H. Johnson, B.Sc., Sydney.

George W. McCoy, M.D., San Francisco.

Carl T. Möller, M.B., Germiston, Transvaal.

C. Vere Nicoll, M.R.C.S., Kajang, F.M.S.

William Oscar Pou, M.D., Kuantan, F.M.S.

C. H. D. Ralph, M.R.C.S., Sekondi, Gold Coast.

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